National Ground-Water Monitoring Network

Advisory Committee on Water Information—Subcommittee on Ground Water

Building Effective Map-based Portals for Dissemination and Communication of Water Resource Data: NGWMN Case Study

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Office of Water Information

U.S Geological Survey

16th National Monitoring Conference

May 4, 2016

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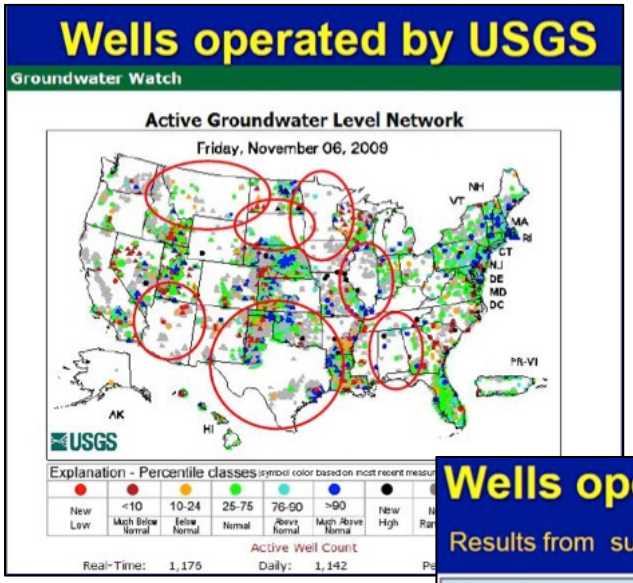
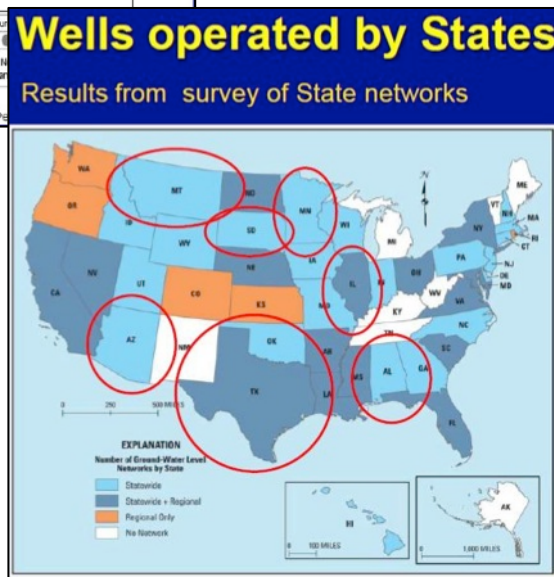
Objectives, Users & Balancing User Needs

NGWMN DATA PORTAL OVERVIEW

Portal Objectives

- Integrate National, State and Local GW data
  - Well characteristics
    - Lithology
    - Well construction
  - Water levels
  - Water-quality
- Available through a single web portal
- Network of expert-selected sites, not a Data Warehouse
- Dynamically access data from original sources
- Near real-time data available





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Advisory Committee on Water Information

National Ground-Water Monitoring Network

NGWMN NETWORKS

Water level: ☑

Subnetwork: All | Background | Suspected Changes | Known Changes

Monitoring Category: All | Surveillance | Trend | Special

Water quality: ☑

Subnetwork: All | Background | Suspected Changes | Known Changes

Monitoring Category: All | Surveillance | Trend | Special

FILTER MAP DATA

Principal Aquifer

Available Data

Water Level | Water Quality | Well Log

CURRENT STATUS

4801 Sites mapped
4801 Sites matching filter
3967 Water-level network wells
1231 Water-quality network wells

TIPPECANOE 17 (TC 17)

SUMMARY | WELL LOG | WATER LEVELS | WATER QUALITY

Agency	U.S. Geological Survey (National Water Information System)
Site Name	TIPPECANOE 17 (TC 17)
Site #	402734087033401
Lat/Long(WGS84)	40.4595,-87.0595
Well Depth	212.54 ft
Local Aquifer Name	Outwash
National Aquifer Name	Sand and gravel aquifers (glaciated regions)
Water Level Network	Surveillance - Background
Water Quality Network	Unknown - Unknown

INDIANA DEPARTMENT OF NATURAL RESOURCES

SELECT FOR DOWNLOAD

BIG SPRING FISH HATCHERY - WELL FWPL-06

SUMMARY | WELL LOG | WATER LEVELS

Depth of water level, feet below land surface

SELECT FOR DOWNLOAD

SMITH AL

SUMMARY | WELL LOG | WATER LEVELS

Longitude: 47.3237
Latitude: -106.9149
Elevation: 2638.00 ft.
Well Depth: 145.00 ft.

CLAY, SAND, SHALE, COAL, ROCK, SAND

Depth From (ft)	Depth To (ft)	Lithology	Description
140.00	145.00	CLAY	CLAY
110.00	140.00	SAND	SAND
20.00	110.00	SHALE	SHALE
15.00	20.00	COAL	COAL
12.00	15.00	ROCK	ROCK
0.00	12.00	SAND	SAND

SELECT FOR DOWNLOAD

Site Selection

Site Name	Agency	WL	WQ	Log
154-082-03CDC3	USGS	●	●	●
SMITH AL	MBMG	●	●	●
PIA-2000A Cisco	ISWS	●		●
Spring Branch Quad	TWDB		●	●

4 sites selected. SAVE LIST | REMOVE SELECTED | DOWNLOAD

CANADA
MÉXICO
Pacific Ocean
Caribbean Sea
VENEZUELA
COLOMBIA
PERÚ
AMAZON BASIN

1000 km
1000 mi

-179.705203, 74.216879

Network Growth

National Ground-Water Monitoring Network

The National Ground-Water Monitoring Network (NGWMN) is a product of the Subcommittee on Ground Water of the Federal Advisory Committee on Water Information (ACWI). The NGWMN is a compilation of selected groundwater monitoring wells from Federal, State, and local groundwater monitoring networks across the nation.

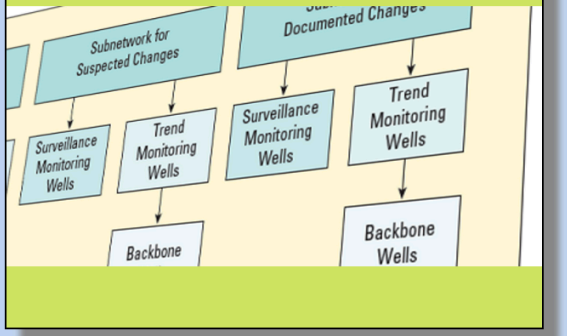
The NGWMN Data Portal provides access to groundwater data from multiple, dispersed databases in a web-based mapping application. The portal contains current and historical data including water levels, water quality, lithology, and well construction. The NGWMN is currently in the process of adding new data providers to the Network. Agencies or organizations collecting groundwater data can find out more about becoming a data provider for the Network here.

Funding to support data providers to the National Ground-Water Monitoring Network is provided through USGS Cooperative Agreements. Information about the latest status of the USGS cooperative agreements is available here.

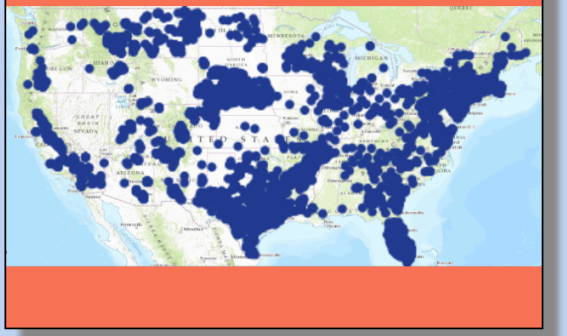
NETWORK STATUS:

- 4,801 sites
- 48 states
- 55 Principal Aquifers
- 6.5 M Water Levels
- 570 K Water Quality Samples

LEARN about the Network



EXPLORE the Network



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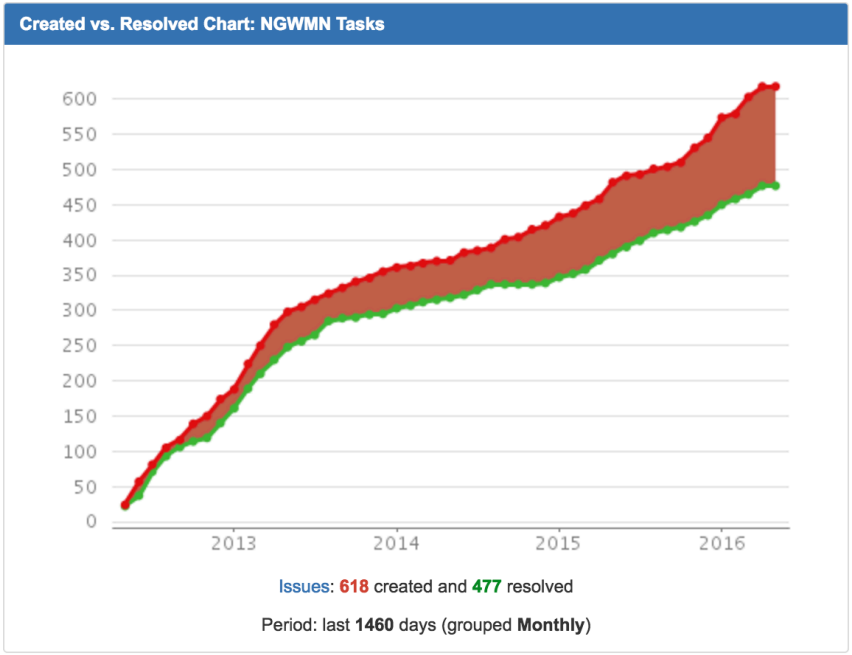
Users of NGWMN

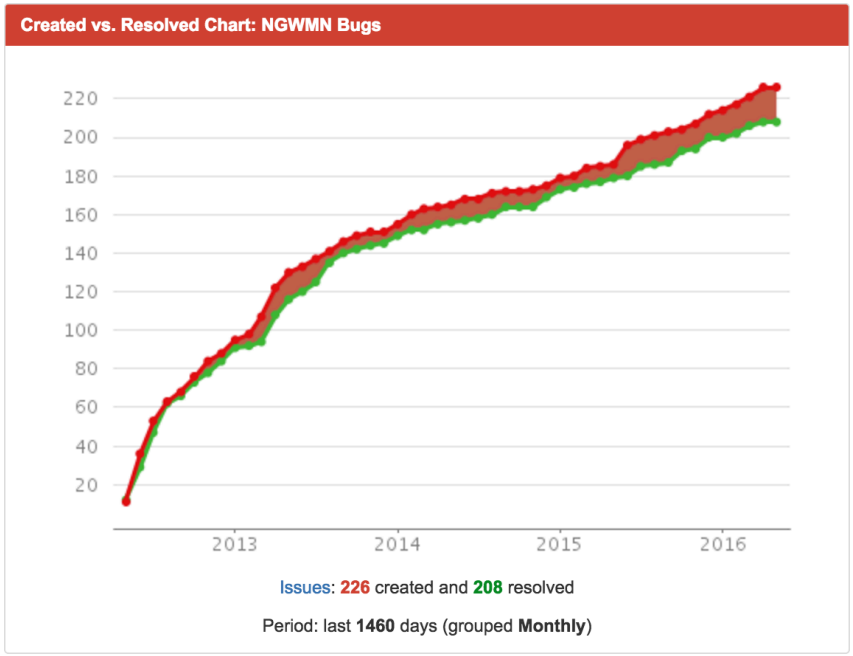
Public
Media
Educators
Students
Environmental Organizations
Congressional Staffers
Policy Makers
Compliance Officers
State Agencies
Federal Agencies
City Planners
Municipalities
Water Utilities
Drillers
Developers
Engineers
Researchers
Groundwater Consultants

Primary Objectives:

1. Learn about in groundwater in my backyard
2. Learn about groundwater for a region or locality (local, state, interstate)
3. Access data and analyze it with other tools

Consequences of Product Maturity





- Growing feature requests
- Growing bug reports
- Limited developer time

How do we fill a users need…

http://ux.stackexchange.com/questions/76699/the-value-of-bloat

…while maintaining simplicity?

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Which would you rather use…

http://ux.stackexchange.com/questions/76699/the-value-of-bloat

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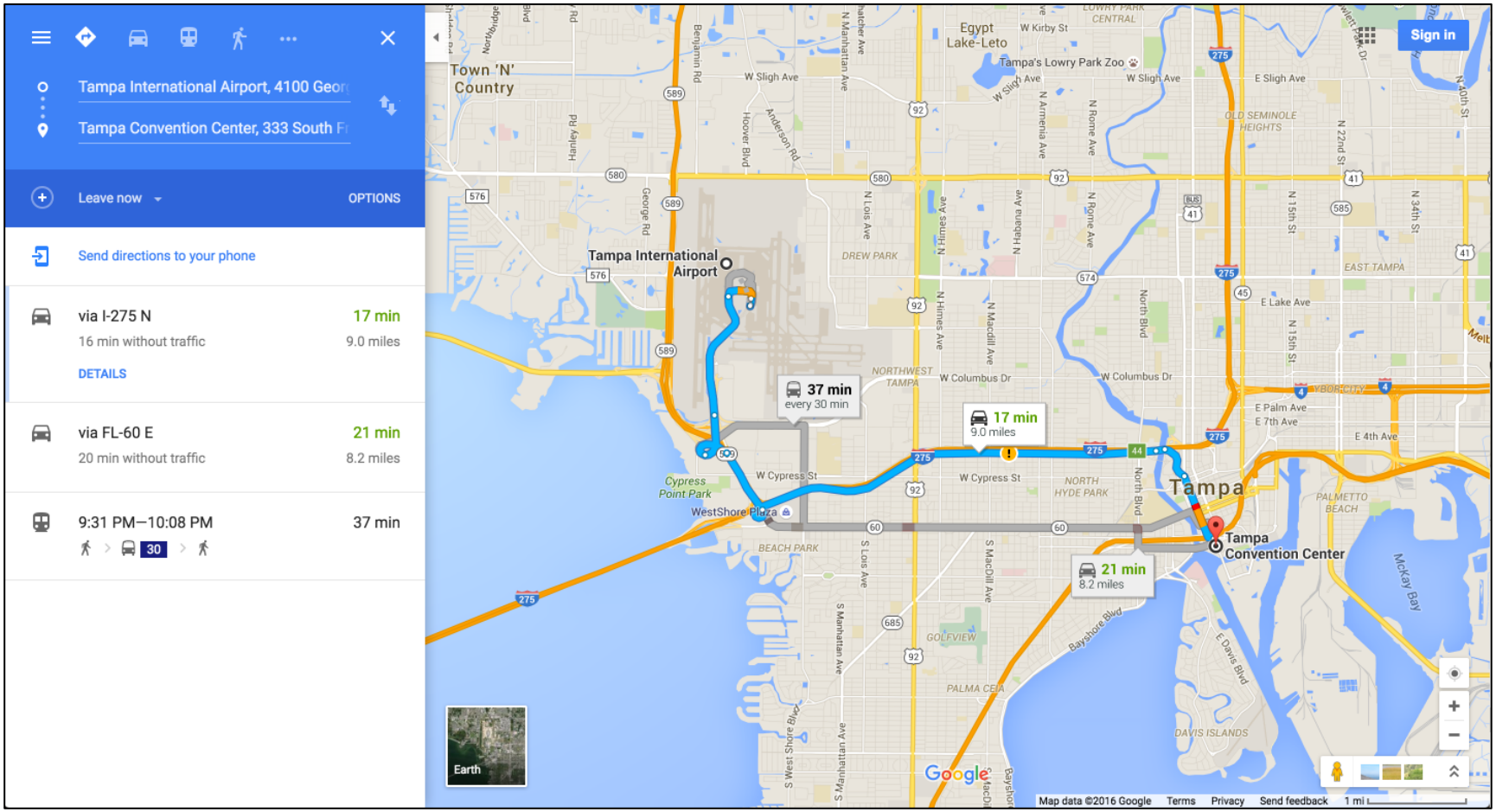
Which would you rather use…



https://www.google.com/maps/

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Getting the Most Value for $$$

1. Domain Expert Opinion
2. IT Expert Opinion
3. User Groups
4. Usability Testing
5. WEB ANALYTICS!!!

http://www.iheartpublix.com/

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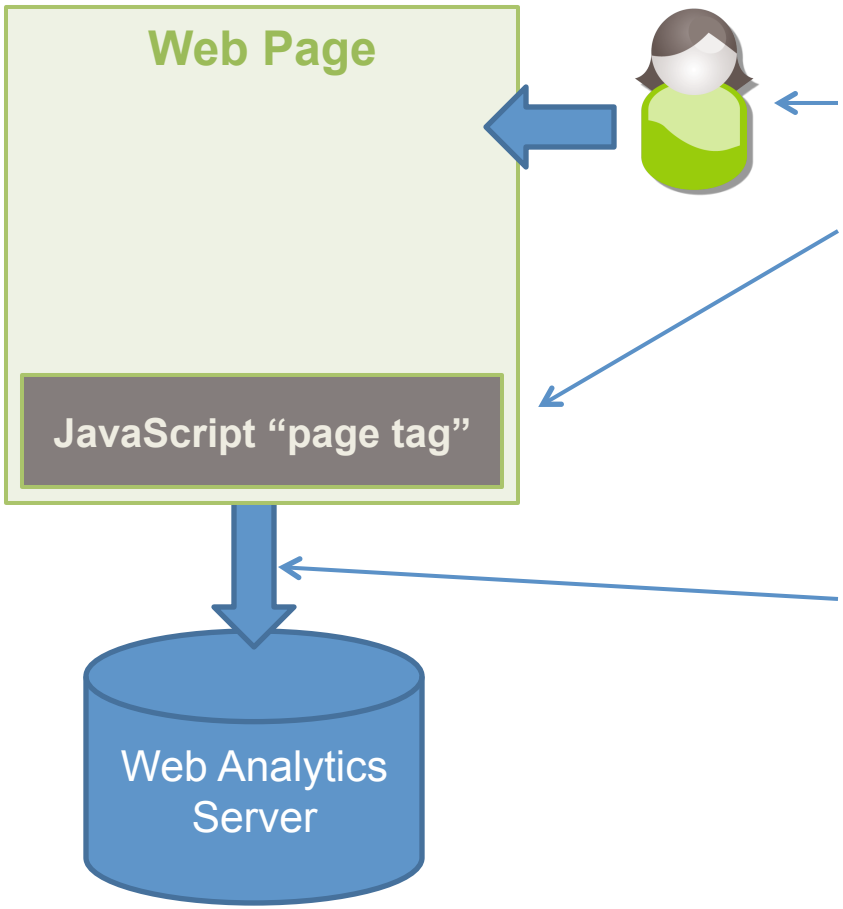
Introduction, Methods & Basic User Information

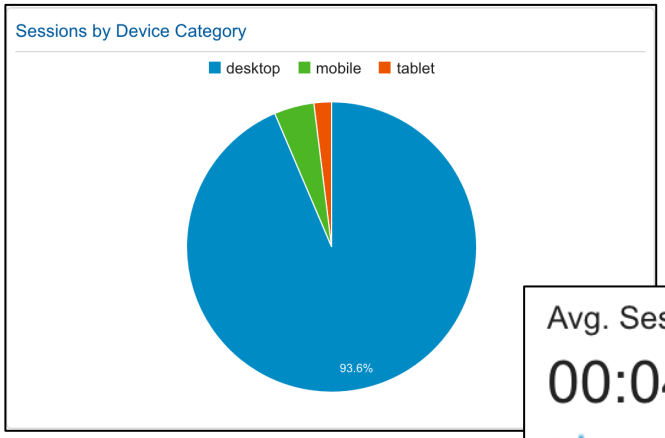
WEB ANALYTICS

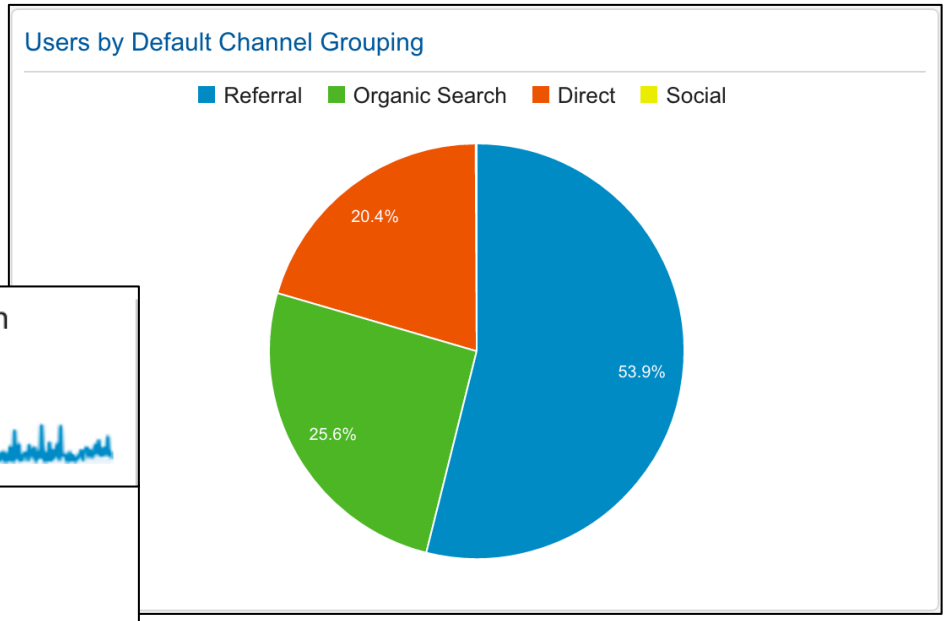
How Web Analytics Work: Tracking

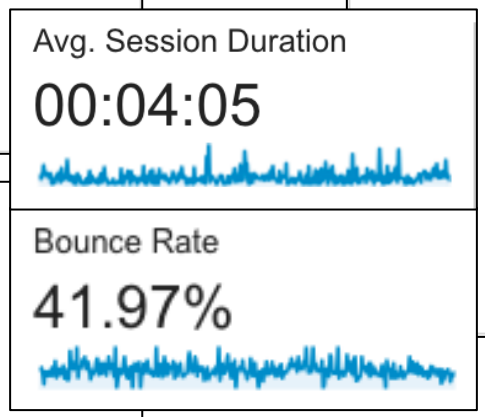


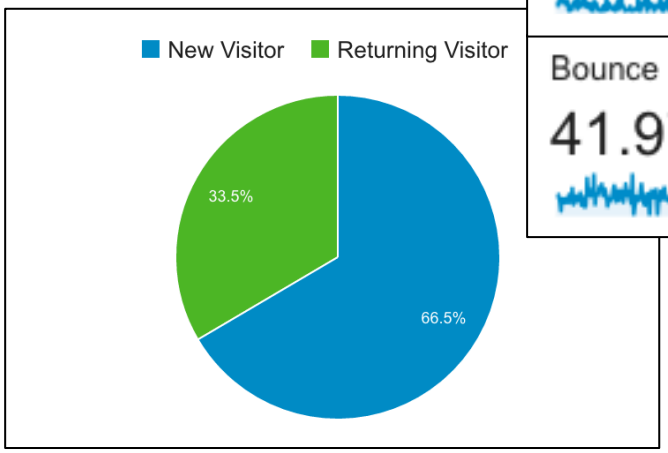
1. Visitor arrives on web page
2. JavaScript detects:
   - Which page was visited
   - Whether the visitor has been to the site before
   - Where the visitor came from
   - How long they visit the page
   - What type of device is used
   - Etc.
3. JavaScript makes a call to web analytics tool with all of this information

Basic User Information







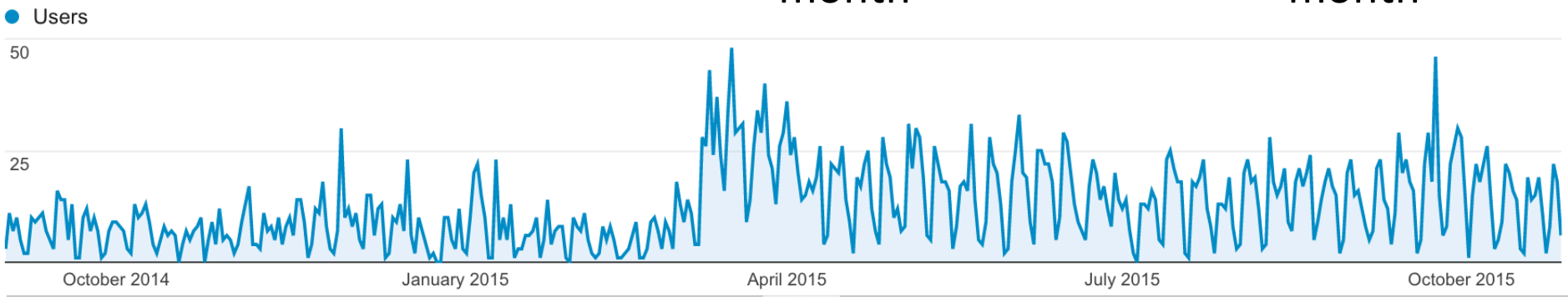


2014

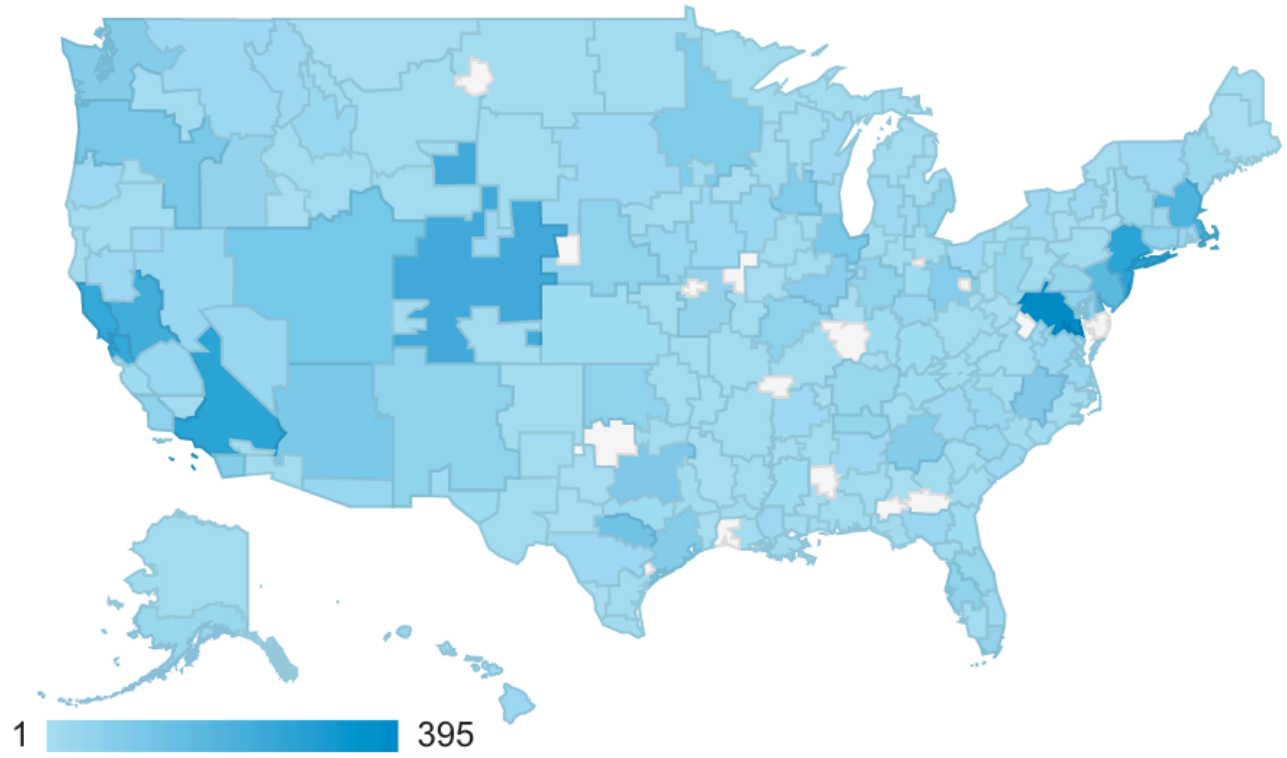
95 avg. users / month

2015

369 avg. users / month



Users



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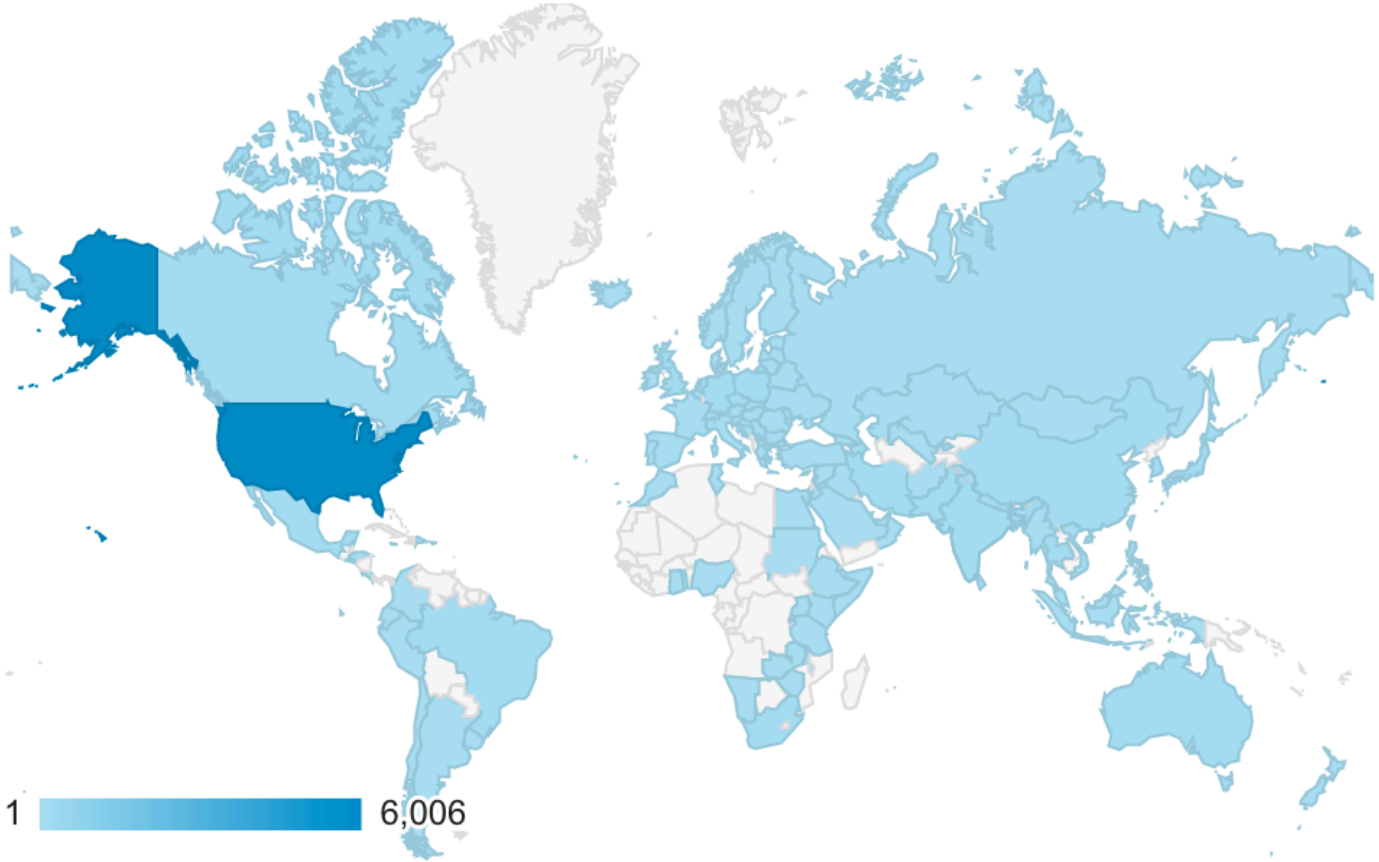
Users



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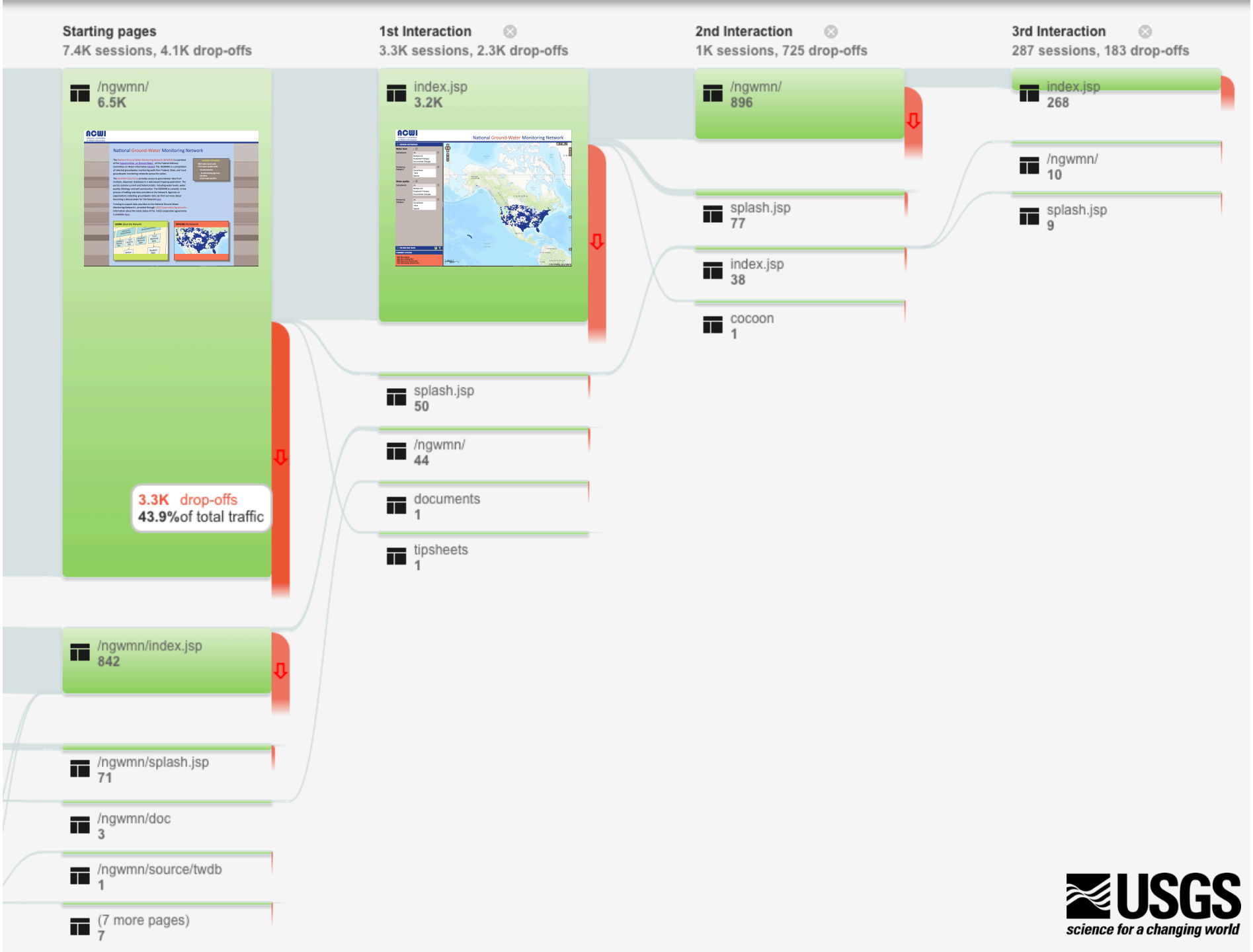
Starting pages
7.4K sessions, 4.1K drop-offs
1st Interaction
3.3K sessions, 2.3K drop-offs
2nd Interaction
1K sessions, 725 drop-offs
3rd Interaction
287 sessions, 183 drop-offs
/ngwmn/
6.5K
National Ground-Water Monitoring Network
3.3K drop-offs
43.9%of total traffic
/ngwmn/index.jsp
842
/ngwmn/splash.jsp
71
/ngwmn/doc
3
/ngwmn/source/twdb
1
(7 more pages)
7
index.jsp
3.2K
National Ground-Water Monitoring Network
splash.jsp
50
/ngwmn/
44
documents
1
tipsheets
1
/ngwmn/
896
splash.jsp
77
index.jsp
38
cocoon
1
index.jsp
268
/ngwmn/
10
splash.jsp
9
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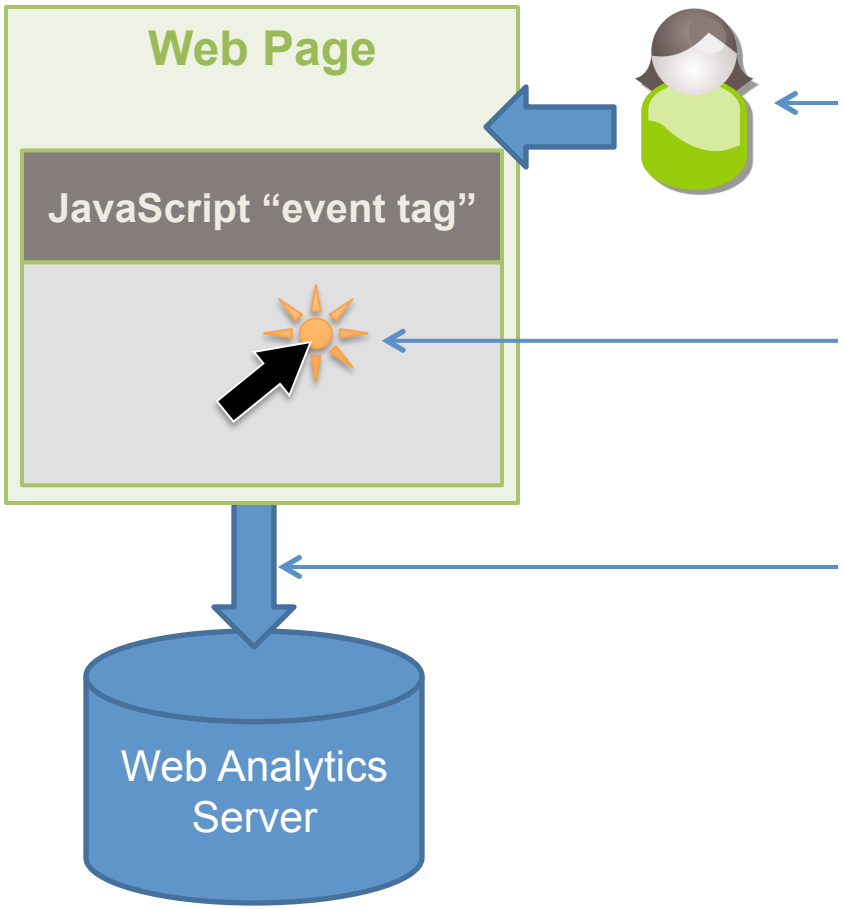
How Web Analytics Work: Events



1. Visitor clicks on a component with an event (e.g. button)
2. JavaScript detects that a component with an event was clicked on
3. JavaScript makes a call to web analytics tool with the event information

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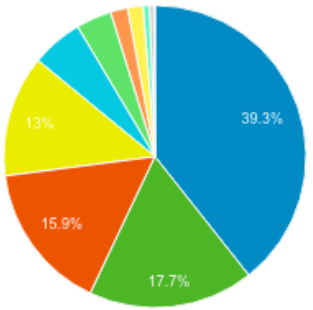
Using analytics to inform investment in product development

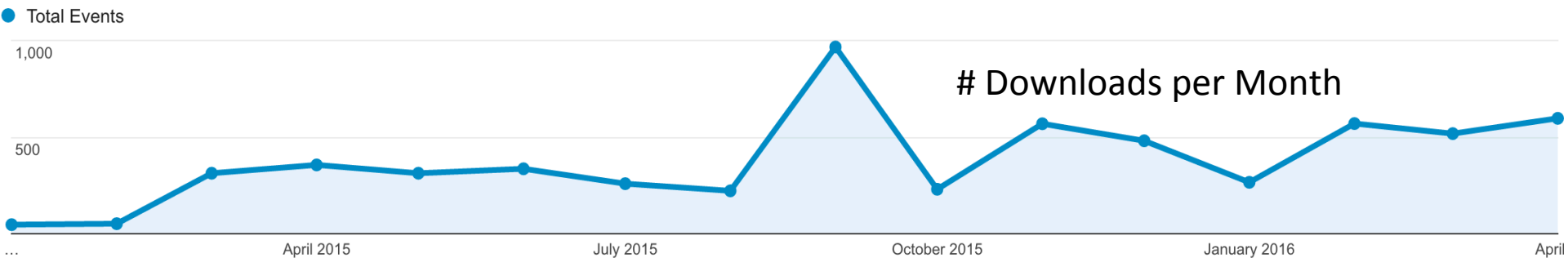
UNLEASHING THE POWER

1 Using Stats to Evaluate Feature Use

Event Category	Total Events	Total Events
	41,359 % of Total: 100.00% (41,359)	41,359 % of Total: 100.00% (41,359)
1. Identify	16,274	39.35%
2. panel filter	7,316	17.69%
3. panel filter option	6,582	15.91%
4. Download	5,372	12.99%
5. panel	2,275	5.50%
6. Data Type	1,572	3.80%
7. filters	760	1.84%
8. ExternalLink	679	1.64%
9. download options	286	0.69%
10. save filters accessed	57	0.14%
11. map layers	44	0.11%
12. save filters	37	0.09%
13. help button	22	0.05%

Contribution to total: Total Events





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National Ground-Water Monitoring Network

NGWMN NETWORKS

Water level:

Subnetwork: All
- Background
- Suspected Changes
- Documented Changes

Monitoring Category: All
- Surveillance
- Trend
- Special

Water quality:

Subnetwork: All
- Background
- Suspected Changes
- Documented Changes

Monitoring Category: All
- Surveillance
- Trend
- Special

FILTER MAP DATA

CURRENT STATUS

4801 Sites mapped
4801 Sites matching filter
3967 Water-level network wells
1231 Water-quality network wells

3 sites were identified nearby. Select one...

Agency	Site No	Site Name	Principal Aquifer
MN DNR	242150	27045	Cambrian-Ordovician aquifer..
MN DNR	206915	27010	Cambrian-Ordovician aquifer..
MN DNR	208866	27043	Cambrian-Ordovician aquifer..

SELECT ALL FOR DOWNLOAD

Base Layer
- World Topo Map
- World Light Gray Base
- World Imagery
- World Street Map
- World Relief Map

Overlays
- Principal aquifers
- Alluvial aquifers
- World Hydro Reference

Beaufort Sea
Baffin Bay
Pacific Ocean
VENEZUELA
COLOMBIA
PERU
AMAZON BASIN
1000 km
1000 mi
-179.705203, 74.216879

1 Using Stats to Evaluate Feature Use

Event Category	Total Events	Total Events
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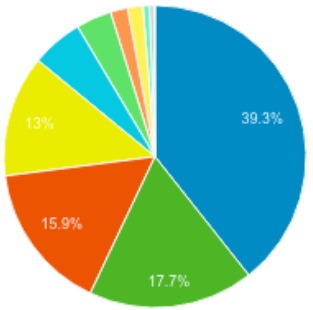
12. save filters	37	0.09%
13. help button	22	0.05%

Contribution to total: Total Events



save filter events per Month

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NGWMN NETWORKS

FILTER MAP DATA

Principal Aquifer

Available Data

Water Level | Water Quality | Well Log

Site Type

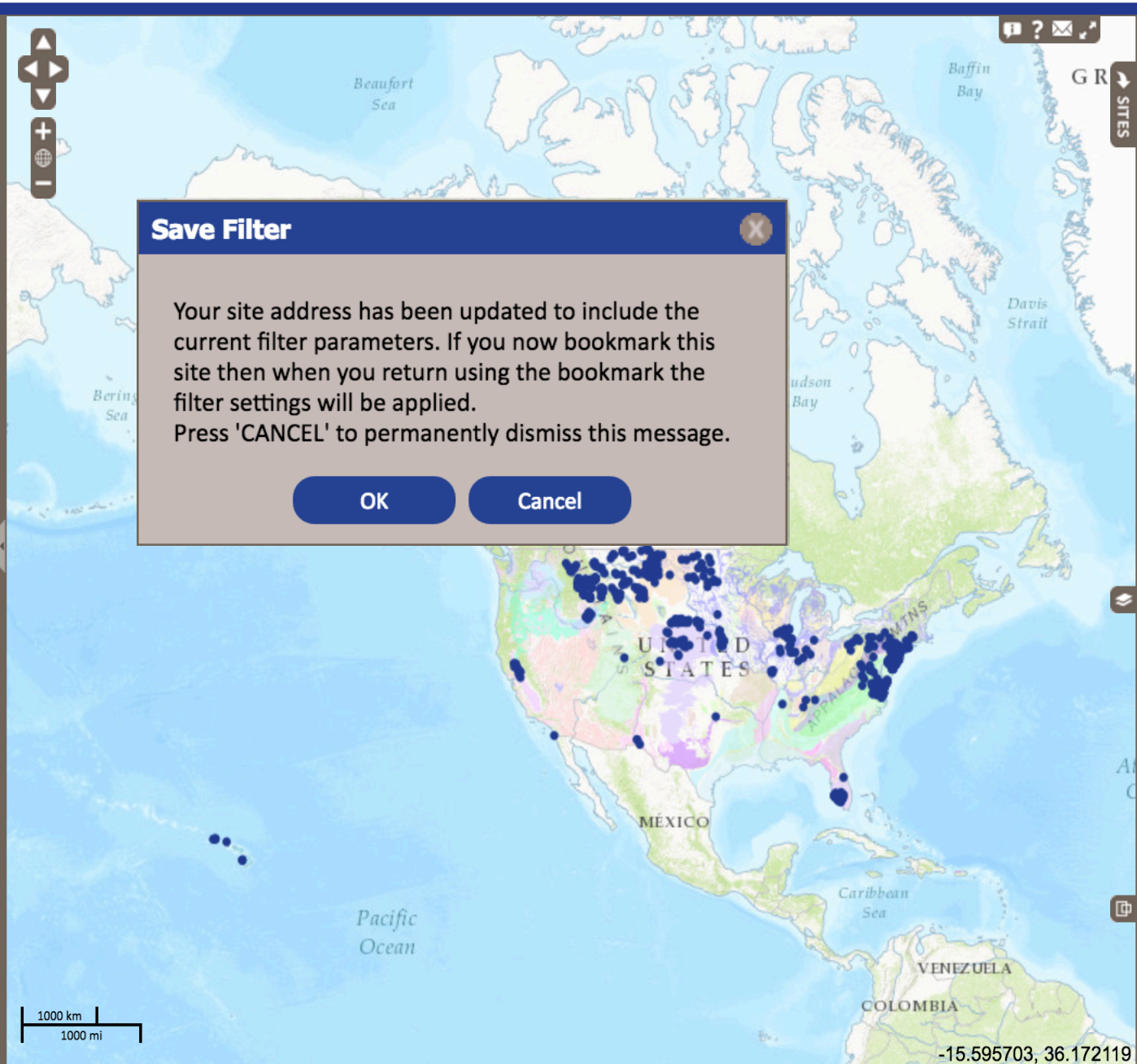
State and County

Contributing Agency

Aquifer Characteristics

CURRENT STATUS

985 Sites mapped
985 Sites matching filter
818 Water-level network wells
545 Water-quality network wells

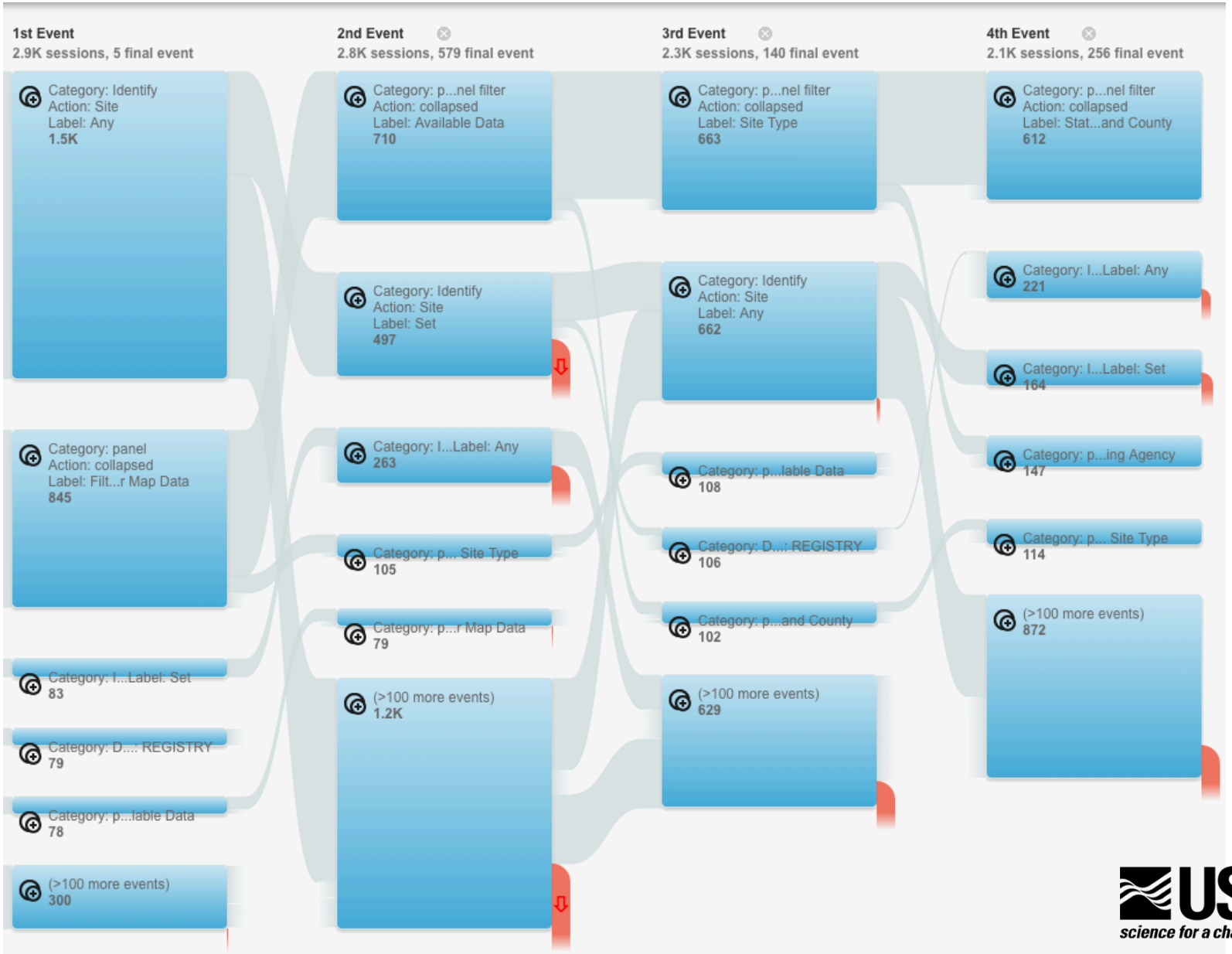


Save Filter

Your site address has been updated to include the current filter parameters. If you now bookmark this site then when you return using the bookmark the filter settings will be applied.
Press 'CANCEL' to permanently dismiss this message.

OK | Cancel

2 Analyzing Workflows



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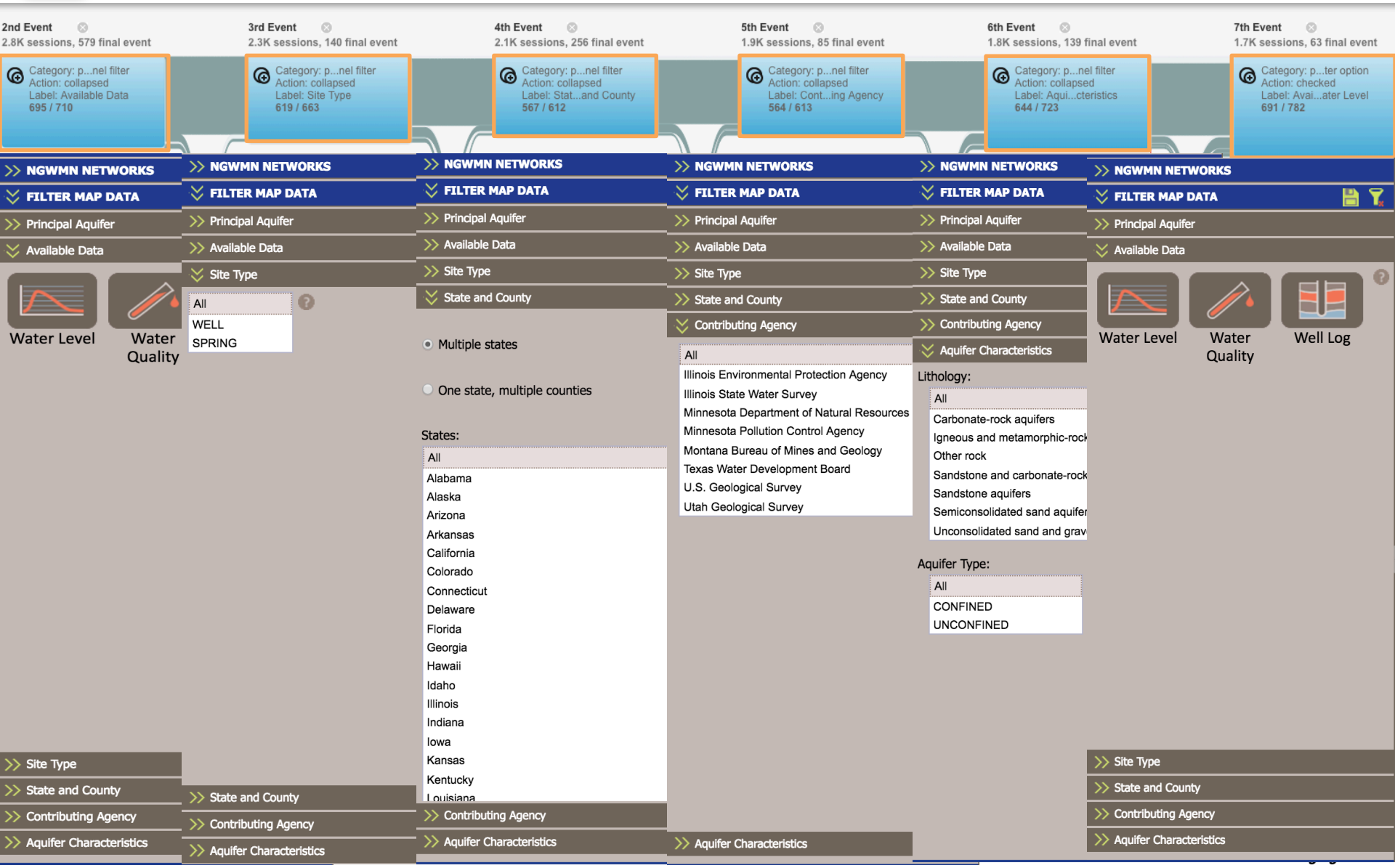
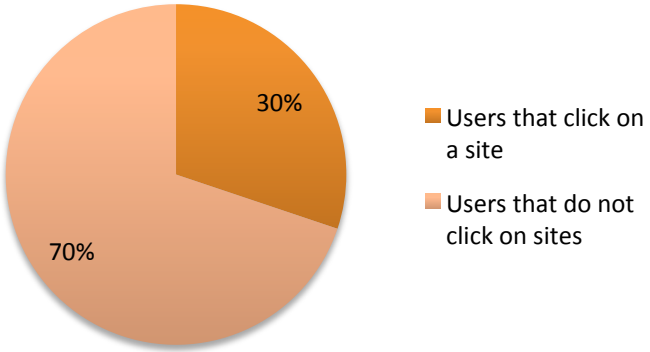
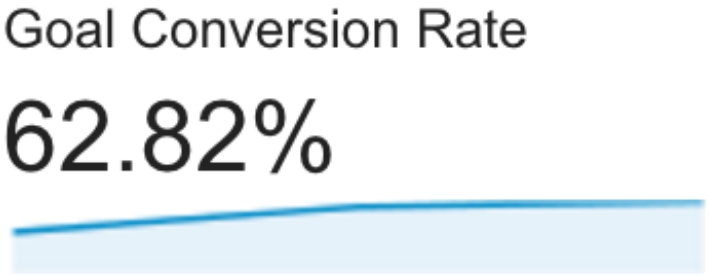
2 Analyzing Workflows



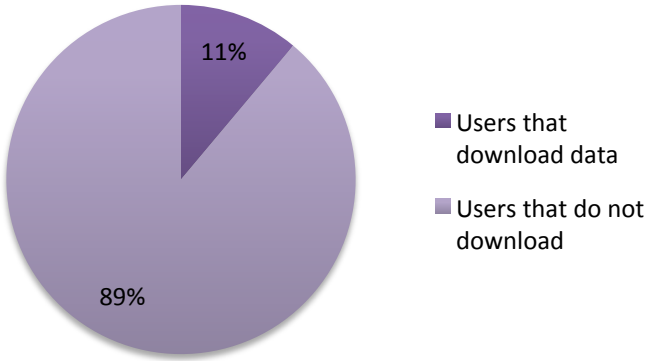
3 Using Goals to Focus Development

% Users that Click on Sites

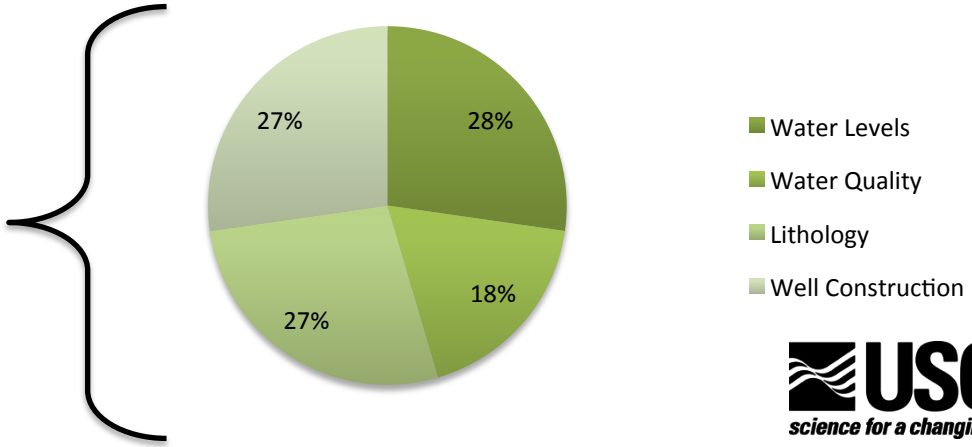




% Users that Download Data



Data Download Types



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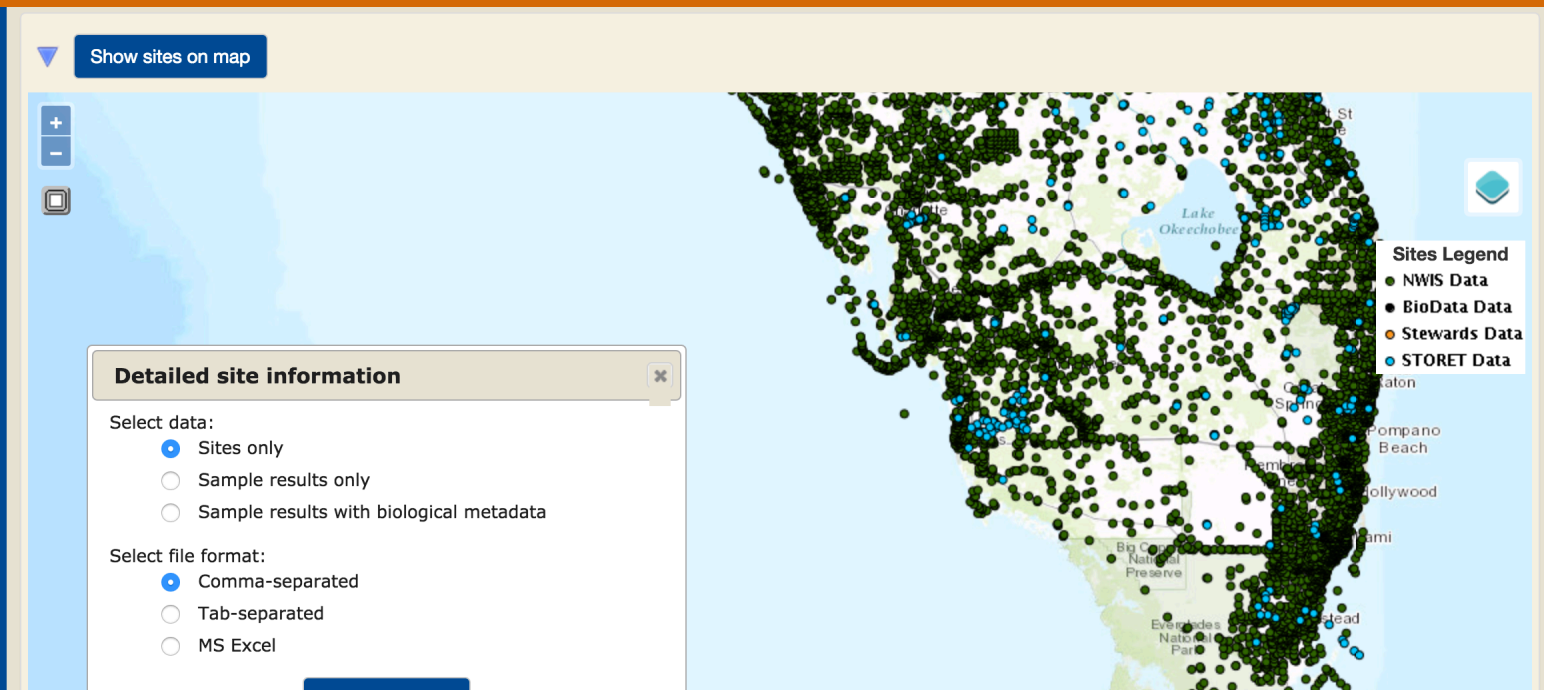
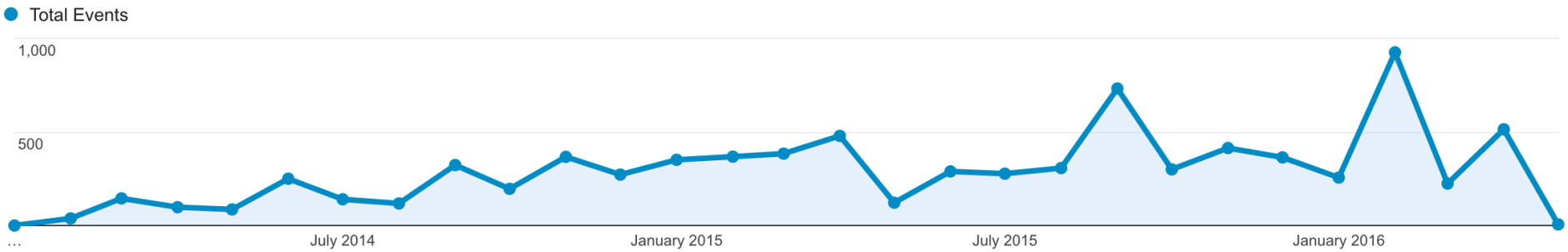
National Water Quality Monitoring Council

Working together for clean water

Water Quality Data

WQP Home | Download Data | How to use the WQP | National Results Coverage | About the WQP





Usability Testing + Web Analytics

- Analytics can suggest areas for testing
  - Example: could use further testing on download
- Analytics can verify improvements resulting from usability tests

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Recommendations

- Usability test to confirm re-order of filter stack
  - Available data types is most popular filter
  - Order filters based on popularity
- Conduct usability testing on data downloads
- Could remove rarely used features
  - E.g. collapsing/expanding filters & map
- Work on search engine optimization

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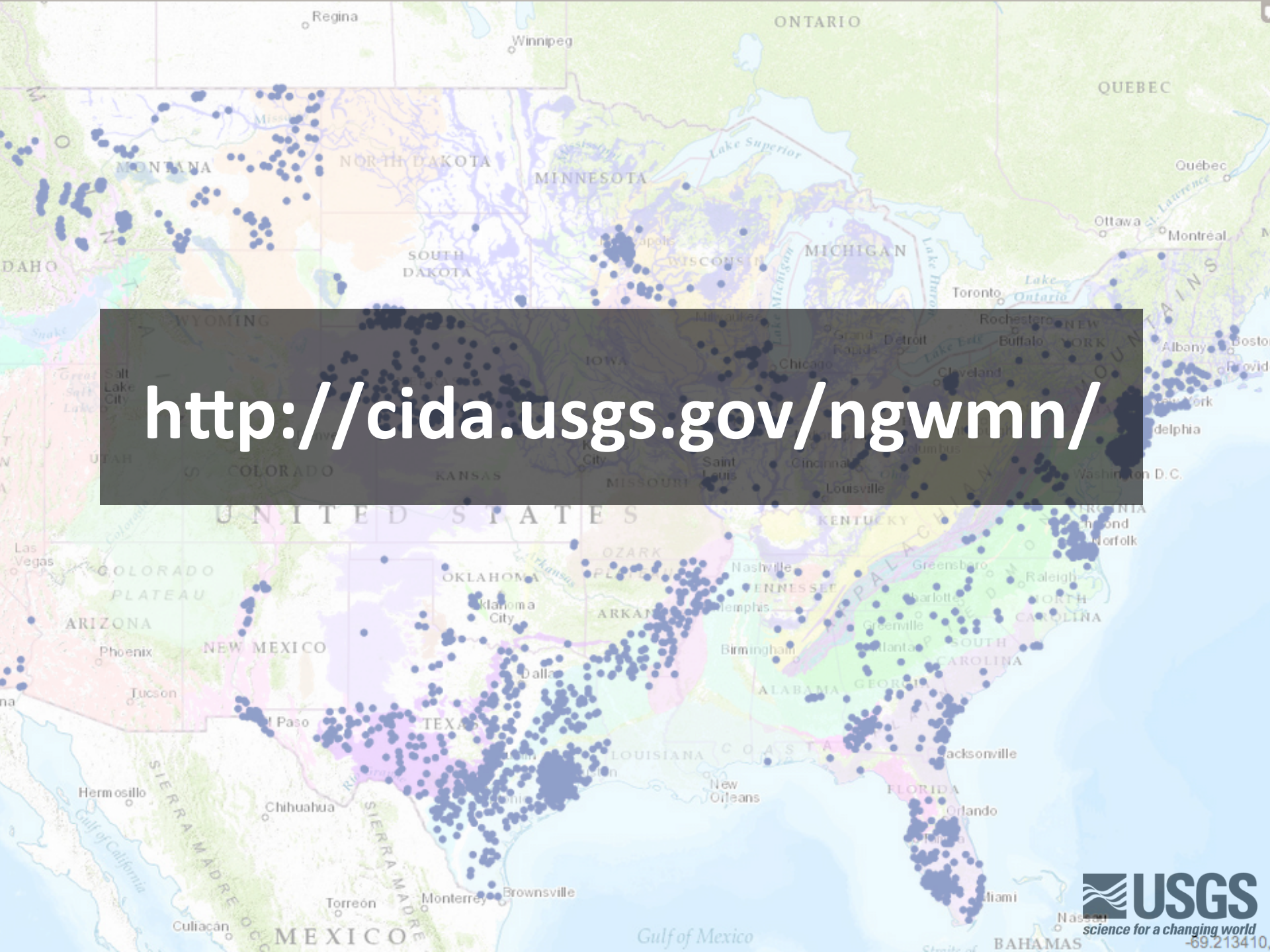
Acknowledgements

- USGS Developers (past & present): Dave Uselmann, Marty Wernimont, Roger Hayes, and I-Lin Kuo
- Jim Kreft – WQP Project Manager
- Sponsors: Daryll Pope & Bill Cunningham
- ACWI Subcommittee on Ground Water
- Data providers


http://cida.usgs.gov/ngwmn/
Regina
Winnipeg
ONTARIO
QUEBEC
MONTANA
NORTH DAKOTA
MINNESOTA
Lake Superior
Québec
Ottawa
Montréal
SOUTH DAKOTA
MICHIGAN
Toronto
Lake Ontario
WYOMING
Detroit
Buffalo
Albany
Chicago
Cleveland
Salt Lake City
IOWA
COLORADO
KANSAS
MISSOURI
Saint Louis
Cincinnati
Louisville
Washington D.C.
Philadelphia
UNITED STATES
KENTUCKY
Las Vegas
COLORADO PLATEAU
OKLAHOMA
Nashville
Greensboro
Raleigh
Oklahoma City
ARKANSAS
TENNESSEE
Memphis
Charlotte
ARIZONA
NEW MEXICO
Phoenix
Birmingham
Atlanta
SOUTH CAROLINA
Dallas
Tucson
ALABAMA
El Paso
TEXAS
LOUISIANA
COASTAL PLAIN
Jacksonville
Hermosillo
Chihuahua
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